

Ganpat University**B. Tech. Regular Examination**

NOV 2014

5th Semester Civil Engineering**2CI504 Elements of Structural Design**

- Instructions: -**
- (1) Answer to the two sections must be written in **separate** answer books.
 - (2) Figures to the **right** indicate full marks.
 - (3) Assume suitable data if required.

Time: 3 Hours**Total Marks : 7****Section – I**

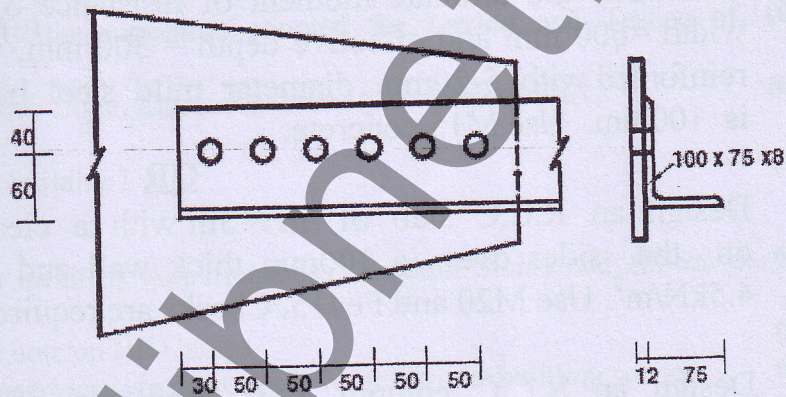
- 1 (A) A singly reinforced R.C.C beam 300 mm wide and effective depth 450mm is reinforced with 4 bars of 20 mm diameter. Find out the depth of neutral axis, limiting depth of neutral axis and specify type of beam. Use M20 and Fe 415. **6**
 - (B) Determine the ultimate moment of resistance of a T Beam having flange width =600 mm and effective depth = 300 mm, web width = 200 mm. It is reinforced with 5-20mm diameter mild steel bars. The thickness of slab is 100mm. Use M15 concrete. **6**
- OR**
- 1 Design an R.C.C slab of 7m × 3m with a clear span of 3m supported on the sides over a 300mm thick wall and is carrying a live load of 4.5kN/m². Use M20 and Fe415. Checks are required. **12**
 - 2 (A) Design an R.C.C column 4.5m high and effectively held in position and restrained against rotation at both ends. It is carrying a factored load of 1600kN. Use M20 and Fe 415. **4**
 - (B) Design an isolated square footing for a square column is 400 mm X 400 mm for axial load of 800 kN. Safe bearing capacity of soil is 120 kN/m². Use M20 and Fe 250. Checks are not required. **7**
 - 3 **Attemp any THREE.** **12**
 - (A) Explain the Different types of slab with sketch.
 - (B) What is control of deflection? Write down the IS 456 provision for same.
 - (C) Which are the methods of design for RCC? Explain them.
 - (D) What is the function of transverse reinforcement in a column?

Section – II

4 Attempt any THREE.

- (A) Explain Compression Member & Type of Compression Member.
- (B) Advantage and Disadvantage of Bolted Connection
- (C) Explain Shear Capacity of HYFG Bolting with Code Provision
- (D) Explain Block Shear Failure with Neat Sketch with Code Provision

5 A single unequal angle 100 x 75 x 8 mm is connected to a 12 mm thick gusset plate at the ends with 6 numbers of 20 mm diameter bolts to transfer tension as shown in Fig. Determine the design tensile strength of the angle if the gusset is connected to the 100 mm leg. The yield strength and ultimate strength of the steel used are 250 MPa and 400 MPa. The diameter of the bolts used is 20 mm. 11



6 Attempt any two: 12

- (A) Two Fe 410 grade plates of 6mm thickness are connected by single bolted lap joint with 20mm diameter bolt 4.6 grade at 50mm pitch calculate the efficiency of joint.
- (B) A tie member of a roof truss consists of 2 ISA 100x75x8 mm. The angles are connected to either side of a 10 mm gusset plates and the member is subjected to a working pull of 300 kN. Design the welded connection. Assume connections are made in the workshop.
- (C) Determine the Compressive strength of a single ISA 100 x 100 x 8 mm with the length of member 2.5m. The ends of the members is fixed. Assume that the load is applied concentrically to the angle. Take $f_y = 250\text{MPa}$.

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